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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER
LARKIN, DANIEL SEAN

ART UNIT	PAPER NUMBER
2856	

DATE MAILED: 07/09/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.	Applicant(s)
09/904,634	CHAND et al.
Examiner	**Art Unit**
Daniel Larkin	2856

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *THREE (3)* MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on *21 April 2003 and 28 April 2003* .

2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-73* is/are pending in the application.

4a) Of the above, claim(s) *1-24 and 33-73* is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *25-31* is/are rejected.

7) ☒ Claim(s) *32* is/are objected to.

8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on *13 Jul 2001* is/are a) ☒ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☐ All b) ☐ Some* c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

a) ☐ The translation of the foreign language provisional application has been received.

15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). *4*
4) ☐ Interview Summary (PTO-413) Paper No(s). _____
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Election/Restriction

1. Applicants' election of the species embodied in claims 25-32 in Paper No. 7 is acknowledged. Because Applicants did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

2. Claims 1-24 and 33-73 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim. Election was made without traverse in Paper No. 7.

Specification

3. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicants' cooperation is requested in correcting any errors of which Applicants may become aware in the specification.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 25-27, and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by US 5,461,907 (Tench et al.).

With respect to the limitations of claim 25, the reference to Tench et al. discloses that a sample is scanned, then a position of interest is found, and a given voltage is applied to a cantilever to make the cantilever slam into the sample surface to manipulate the sample through the creation of an indentation in the sample. The indentation/subregion is measured and the hardness of the sample surface is determined using known techniques, col. 7, lines 55-64.

With respect to the limitations of claim 26, the reference to Tench et al. discloses the particular features of the invention, including scanning an object with a cantilever, and if desired performing a hardness determination of the object; identifying a line of cut; scanning along the line of cut; performing a second manipulation of the sample by forming the cantilever to perform a cutting motion as the cantilever scans along; and moving the cut segment to a collection hole. Thus, the reference teaches performing a first manipulation which involves a hardness determination, and a second manipulation which involves manipulating particles of the sample. The reference to Tench et al. discloses, as shown in Figures 5 and 6, that the initial scanning/imaging of the sample may be undertaken using a cantilever with a conventional tip (41, 49); and the manipulation/cutting of the sample is undertaken using a cantilever having a knife-edge tip (43, and 46, 47).

With respect to the limitations of claim 27, the reference to Tench et al. states that the manipulation/indentation of the sample is performed with the same probe used to initially scan the sample surface.

With respect to the limitations of claim 29, the reference to Tench et al. discloses the particular features of the invention, including scanning an object with a cantilever, and if desired performing a hardness determination of the object; identifying a line of cut; scanning along the line of cut; performing a second manipulation of the sample by forming the cantilever to perform a cutting motion as the cantilever scans along; and moving the cut segment to a collection hole, col. 8, lines 14-34. Thus, the reference teaches performing a first manipulation which involves a hardness determination, and a second manipulation which involves manipulating particles of the sample.

6. Claims 25, 27, and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by "Controlled Manipulation of Molecular Samples with the NanoManipulator" (Guthold et al.).

With respect to the limitations of claim 25, the article to Guthold et al. discloses a nanoManipulator that scans a region of the surface of a sample with probe. Biological samples, such as fibrin and DNA, undergo manipulation by the probe. The article discloses in Figures 2A, D and Figure 4, imaging of a fibrin sample and a DNA sample prior to manipulation. Figures 2C, F and Figure 4B depict images of the fibrin sample and the DNA sample after manipulation.

With respect to the limitations of claim 27, the reference discloses that the nanoManipulator is used for scanning and manipulation of the samples.

With respect to the limitations of claim 29, the article discloses that manipulation of particles takes place.

7. Claims 25 and 27-29 are rejected under 35 U.S.C. 102(b) as being anticipated by US 5,343,042 (Fuchs et al.).

With respect to the limitations of claim 25, the reference to Fuchs et al. discloses the use of an STM or an AFM in order to modify/manipulate the structure of a surface. The reference states that the structure can be imaged before and after modification has taken place, col. 2, lines 56-65.

With respect to the limitation of claim 27, the reference to Fuchs et al. discloses that the writing, reading, modification, and erasing operations in any desired sequence and any desired position can be undertaken using the same probe.

With respect to the limitations of claim 28, the reference discloses that an STM is used in three ways in a modification operation of the type cited in claim 25. Firstly, the STM is used to image the unchanged surfaces and the modified surfaces at atomic resolution. Secondly, the STM is used to generate/manipulate structures on the surface of the solid; and thirdly, the STM is used to modify these structures, col. 3, lines 3-10. Specifically, a first image is taken. Then, a first manipulation of the surface occurs through the generation of circular bumps on the sample surface, col. 3, lines 32-38. Then, an image of the manipulation/subregion takes place, col. 3,

lines 42-46 and 50-55. The reference then states that tunneling tip is made to rapidly pass over the bump structure, such that the bump is modified, col. 3, lines 56-68 through col. 6, lines 1-3. Lastly, the modified structures are imaged/rescanned such that the tops of the bumps have now been reshaped to have type of plateau, col. 4, lines 4-11.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 25, 27, and 29-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over "Nanotechnology: Tweezers for the Nanotool Kit" (Mirkin) in view of "Controlled Manipulation of Molecular Samples with the NanoManipulator" (Guthold et al.).

With respect to the limitations of claim 25, the article to Mirkin discloses a nanomolecular tweezer composed of two parallel mounted carbon nanotubes. The article discloses that the tweezers have the potential to be used as a two-probe STM. Utilizing an STM to image a sample is well known in the art force microscopy art. The article states that the tweezers are used to manipulate the sample. The article does not disclose imaging the area where manipulation took place after the step of manipulation has been undertaken. The article to Guthold et al. discloses a

nanoManipulator that scans a region of the surface of a sample with probe. Biological samples, such as fibrin and DNA, undergo manipulation by the probe. The article discloses in Figures 2A, D and Figure 4, imaging of a fibrin sample and a DNA sample prior to manipulation. Figures 2C, F and Figure 4B depict images of the fibrin sample and the DNA sample after manipulation. Imaging the area or the sample after manipulation would have been obvious to one of ordinary skill in the art as a means of ensuring that the sample has been properly manipulated or to assess any possible damage that may have occurred to the sample during the manipulation step.

With respect to the limitation of claim 27, both articles appear to teach or teach that the manipulation and imaging would utilize the same probe tip.

With respect to the limitations of claim 29, the article to Mirkin discloses grabbing particles from a sample surfaces as shown in the Figure.

With respect to the limitation of claim 30, the article to Mirkin shows that the third figure shown picks up a particle from the sample surface.

With respect to the limitation of claim 31, the article to Mirkin describes that the tweezers/probe as a glass pipette cantilevered probe having a first carbon nanotube attached to one side of the pipette and a second carbon nanotube attached on the opposite side of the pipette. The two probes can be used to form a two-probe STM which is used to image a sample.

Allowable Subject Matter

10. The following is a statement of reasons for the indication of allowable subject matter:

Prior art was not relied upon to reject claim 32 because the prior art fails to teach and/or make obvious a method of operating a probe comprising a cantilever and two tips mounted on the cantilever such that a voltage across each tip causes the tips to come together and combine to form a single imaging probe tip in combination with all of the limitations of the base claim and any intervening claims.

11. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Daniel Larkin whose telephone number is (703) 308-6724. The Examiner can normally be reached on Monday-Friday from 7:00 AM - 4:00 PM.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Hezron E. Williams, can be reached on (703) 305-4705. The FAX telephone number for this Technology Center (TC 2800, unit 2856) is (703) 308-7382.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0956.

Daniel Larkin

30 June 2003

DANIEL S. LARKIN
PRIMARY EXAMINER